



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE

United States Patent and Trademark Office

Address: COMMISSIONER FOR PATENTS

P.O. Box 1450

Alexandria, Virginia 22313-1450

www.uspto.gov

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-----------------------------|-------------|-----------------------|---------------------|------------------|
| 10/532,843 | 12/19/2005 | Natarajan Thiagarajan | 1-17016 | 4924 |
| 1678 | 7590 | 11/13/2008 | | |
| MARSHALL & MELHORN, LLC | | | | |
| FOUR SEAGATE - EIGHTH FLOOR | | | | |
| TOLEDO, OH 43604 | | | | |
| EXAMINER | | | | |
| BULLOCK, IN SUK C | | | | |
| ART UNIT | | PAPER NUMBER | | |
| 1797 | | | | |
| MAIL DATE | | DELIVERY MODE | | |
| 11/13/2008 | | PAPER | | |

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/532,843

Applicant(s)

THIAGARAJAN ET AL.

Examiner

In Suk Bullock

Art Unit

1797

Period for Reply -- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 03 July 2008.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 10-20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 10-20 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 19 December 2005 is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-8508)
- 4) ☐ Interview Summary (PTO-413)
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____
- Paper No(s)/Mail Date _____

DETAILED ACTION

Drawings

The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because Figure 2 does not include reference #10 mentioned in the description and the Figure includes reference #17 which is not mentioned in the description. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

Art Unit: 1797

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 10-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over WO 96/33150 (hereinafter "WO") in view of U.S. Patent 5,321,192 to Cottrell et al. (hereinafter "Cottrell").

The WO reference discloses a process for converting alkane to alkene comprising (a) contacting alkane with a dehydrogenation catalyst under conditions sufficient to produce alkene and hydrogen, wherein the dehydrogenation catalyst comprises at least one metal selected from Cr, Mo, Ga, Zn and a Group VIII metal; (b) contacting the effluent from step (a) with an oxidation catalyst and oxygen under conditions sufficient to selectively convert the hydrogen to water, wherein the oxidation catalyst comprises an oxide of at least one metal selected from Bi, In, Sb, Zn, Tl, Pb and Te; and (c) contacting at least a portion of the effluent of step (b) with a solid material

comprising a dehydrogenation catalyst under conditions sufficient to convert unreacted alkane to additional quantities of alkene and hydrogen (page 4, line 18 to page 5, line 2; page 8, lines 5-19; and Figures 1 and 2).

WO fails to disclose to disclose adding water to the effluent of step (a).

Cottrell discloses a dehydrogenation process in which water is injected into two or more of the inlets of each catalytic dehydrogenation zone in admixture with the dehydrogenatable hydrocarbon (col. 1, lines 5-13). It is disclosed that from about 10 to about 300 mole of water or an equivalent water precursor is utilized (col. 2, lines 20-48).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the process of WO by adding water to the dehydrogenation process as taught by Cottrell because Cottrell has taught that the performance of catalyst is significantly increased with addition of water into the dehydrogenation process.

With regard to the claimed dehydrogenation catalyst comprising Pt and Sn on an aluminate carrier, Cottrell discloses a dehydrogenation catalyst comprising Pt and Sn on a porous carrier material (col. 3, lines 45-49 and col. 4, lines 7-10). Since both WO and Cottrell disclose similar effective dehydrogenation catalysts, it would have been obvious to substitute the catalyst the catalyst used in WO for a catalyst taught by Cottrell with a reasonable expectation of success. Substitution of equivalents requires no express motivation. *In re Fount*, 213 USPQ 532 (CCPA 1982); *In re Siebentritt*, 152 USQ (CCPA 1967).

Response to Arguments

Applicants' arguments filed 7/3/2008 have been fully considered but they are not persuasive.

Applicants referred to the discussion on the disadvantage of the WO reference as stated in paragraph 0008 of the instant specification. This discussion with regard to the disadvantage of the WO reference is not persuasive because the reference does not disclose either isothermic or adiabatic mode of the process. However, what the reference clearly teaches is a temperature range of 540-800 deg C for the dehydrogenation step (page 1, lines 31-35) and a temperature range of 400-600 deg C for the oxidative dehydrogenation step (page 6, lines 15-22). This clearly indicates that the reactors are being maintained in certain temperature ranges (i. e., isothermal mode in each reactor).

Applicants then state, "In light of this disadvantage of the primary reference, the combination of this reference with Cottrell does not yield the same process as the present invention. Cottrell utilizes a constant water feed before the first and second process steps (shown in claim 1 (e)). This means that it is not possible to control temperature by variation of the amount of water injected." This argument is not persuasive because the purpose of adding water to the dehydrogenation zones in Cottrell is to significantly enhance the performance of the dehydrogenation catalyst. Further, it should be noted that it is known to those skilled in the art that water/steam is added to a dehydrogenation zone or an oxidative dehydrogenation zone as evidence by Bertus (U.S. Pate 3,972,594; col. 4, lines 54-58 and col. 5, lines 17-19) to improve heat

Art Unit: 1797

transfer. Therefore, one skilled in the art would have been motivated to add water to the dehydrogenation/oxidation zones of WO process to improve the activity of the catalyst as well as to improve heat transfer (control of temperature within specified limits).

With regard to the argument, "Nothing in the Cottrell reference teaches or suggests the use of water in both the liquid state and the gaseous state," the argument is not persuasive because the addition of water for a process operating above 400° C is equivalent to adding steam as evidenced by Bertus. The addition of water in liquid or gaseous form or in a combination is equivalent and has the same function because even addition of water in the liquid form instantaneously becomes vapor/steam upon entering the reactor operating above 400° C.

With regard to the argument that the combined process of WO and Cottrell would be less economical than the claimed invention, the argument is not persuasive because it has been held that a person of ordinary skill in the art would not make the combination because of economic reasons. *In re Farrenkopf*, 713 F.2d 7141, 219 USPQ 1 (Fed. Cir. 1983).

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within

TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to In Suk Bullock whose telephone number is 571-272-5954. The examiner can normally be reached on Monday - Friday 6:00-2:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenn Caldarola can be reached on 571-272-1444. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Art Unit: 1797

/In Suk Bullock/

Examiner, Art Unit 1797